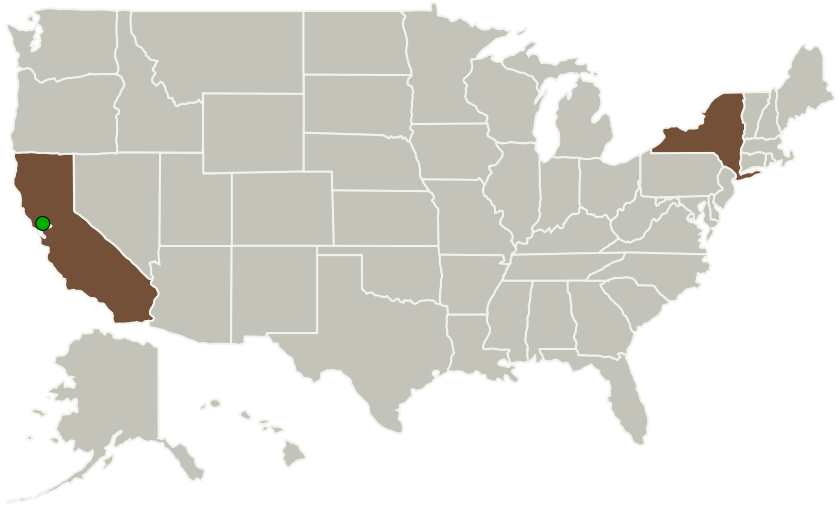
Universal Docking Interface for Free-Flying Robots, Phase I

Completed Technology Project (2017 - 2017)

Project Introduction

Currently, no universal electromechanical engagement interface exists for free-flying robots, limiting their ability to dock, perch, recharge, change tools, manipulate payloads, and assemble in modular structures for intravehicular, extravehicular, and planetary surface operations. Honeybee Robotics (Honeybee) proposes to develop a Universal Docking Interface (UDI) that provides a common electromechanical connection architecture for free-flying robots. The UDI will enhance capabilities to mount and manipulate tools, sensors, payloads; dock for power and data transfer; perch for short- or long-term storage; and create new modular structures for intravehicular, extravehicular, and surface tasks in support of commercial operations and human spaceflight. The UDI will be based on Honeybee's existing solutions for robotic satellite servicing and planetary rover recharge , modified to meet NASA's Space Technology Mission Directorate (STMD) Human Exploration Telerobotics requirements. This reliable plug-and-play docking and manipulation interface will provide an electromechanical quick-connect/disconnect for tools, sensors, and other payloads, as well as enabling truly modular assembly in microgravity. The proposed Phase 1 effort will perform a detailed investigation of tool change, sensor payload interface, manipulation and docking requirements for free-flying robots supporting missions on-orbit, to Mars, the Moon, or NEOs. Interface requirements such as mate/de-mate cycles, stiffness, strength, repeatability, misalignment tolerance, human safety, debris mitigation, and electrical feedthrough characteristics will be derived through contact with potential end users to characterize potential use cases and future mission payloads.

Primary U.S. Work Locations and Key Partners



Universal Docking Interface for Free-Flying Robots, Phase I Briefing Chart Image

Table of Contents

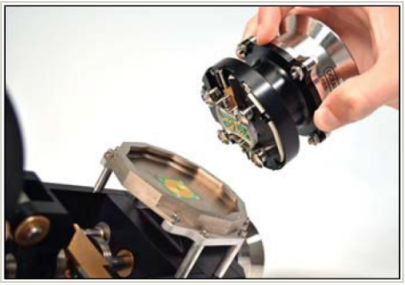
Universal Docking Interface for Free-Flying Robots, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	New York

Images



Briefing Chart Image
Universal Docking Interface for Free-Flying Robots, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/128300)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Honeybee Robotics, Ltd.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

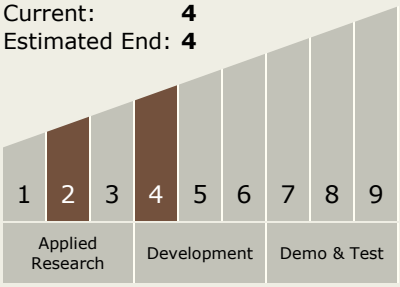
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jason Herman

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Universal Docking Interface for Free-Flying Robots, Phase I

Completed Technology Project (2017 - 2017)

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.6 Robotics Integration
    - TX04.6.1 Modularity, Commonality, and Interfaces

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System